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**CLAIMS**

What is claimed is:

- 5 1. An horological device comprising:  
charging means for receiving and storing an  
electrostatic charge in a charge storage element in a time  
cell in the horological device, wherein the charge storage  
element comprises an internal medium for storing an  
10 electrostatic charge and an insulating medium for insulating  
the internal medium that substantially surrounds the  
internal medium, and wherein the time cell transitions from  
a non-time-measuring state to a time-measuring state in the  
horological device upon receiving the electrostatic charge;  
15 and  
discharging means for discharging the stored  
electrostatic charge in the charge storage element using a  
discharge process with a predetermined discharge rate.
- 20 2. The horological device of claim 1 wherein the  
predetermined discharge rate of the discharge process varies  
with an initial condition of the time cell after the  
programming operation.
- 25 3. The horological device of claim 1 wherein the  
predetermined discharge rate of the discharge process is  
non-linear with respect to time.
- 30 4. The horological device of claim 1 wherein the  
predetermined discharge rate of the discharge process is  
dependent upon a structure of the charge storage element.

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5. The horological device of claim 1 further comprising:  
an array of time cells.

10 7. The horological device of claim 5 wherein at least two  
time cells in the array of time cells have substantially  
identical predetermined discharge rates.

9. The horological device of claim 5 further comprising:  
a programming request processing unit for processing a programming request to set one or more time cells within the array of time cells.

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10. A method for using an horological device, the method comprising:

5 receiving and storing an electrostatic charge in a charge storage element in a time cell in the horological device, thereby transitioning from a non-time-measuring state to a time-measuring state in the horological device, wherein the charge storage element comprises an internal medium for storing an electrostatic charge and an insulating medium for insulating the internal medium that substantially  
10 surrounds the internal medium; and

discharging the stored electrostatic charge in the charge storage element using a discharge process with a predetermined discharge rate.

15 11. The method of claim 10 further comprising:  
programming at least one time cell in an array of time cells.

20 12. The method of claim 11 further comprising:  
controlling the array of time cells through a time cell interface unit by initializing one or more time cells in the array of time cells.

25 13. The method of claim 11 further comprising:  
processing a programming request to set one or more time cells within the array of time cells.

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14. A computer program product on a computer readable medium for use in a data processing system for using an horological device, the computer program product comprising:

5 instructions for receiving a programming request to initialize the horological device; and

10 instructions for programming an electrostatic charge into a charge storage element in a time cell in the horological device, thereby transitioning from a non-time-measuring state to a time-measuring state in the horological device, wherein the charge storage element comprises an internal medium for storing an electrostatic charge and an insulating medium for insulating the internal medium that substantially surrounds the internal medium, wherein the stored electrostatic charge discharges from the charge storage element using a discharge process with a predetermined discharge rate.

15 15. The computer program product of claim 14 further comprising:

20 instructions for programming at least one time cell in an array of time cells.

16. The computer program product of claim 15 further comprising:

25 instructions for controlling the array of time cells through a time cell interface unit by initializing one or more time cells in the array of time cells.

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17. The computer program product of claim 15 further comprising:

instructions for processing a programming request to set one or more time cells within the array of time cells.

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18. An horological device comprising:

an internal medium for storing an electrostatic charge;

an insulating medium for insulating the internal  
medium, the internal medium and the insulating medium

5 forming a charge storage element,

wherein the insulating medium substantially

surrounds the internal medium;

wherein the insulating medium has physical

10 properties that allow a charging process for  
charging the internal medium with an

electrostatic charge through the insulating  
medium;

wherein the insulating medium has physical

15 properties that allow a discharge process for  
discharging a stored electrostatic charge

from the internal medium through the  
insulating medium;

wherein the insulating medium has one or more

20 physical properties that affect a rate of  
discharge in the discharge process; and

wherein at least one physical property of the  
insulating medium has been selected so that

the discharge process discharges a stored  
electrostatic charge at a predetermined

25 discharge rate; and

an electrostatic detector physically coupled to the  
charge storage element for allowing a detection of an  
electrical potential of the internal medium caused by a  
retained electrostatic charge in the internal medium.

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19. The horological device of claim 18 wherein the predetermined discharge rate is non-linear with respect to time.

5 20. The horological device of claim 18 wherein the discharge process is Fowler-Nordheim tunneling.

21. The horological device of claim 18 wherein the charging process is channel hot electron injection.

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22. The horological device of claim 18 further comprising:  
a charge injector for injecting charge through the insulating medium into the internal medium.

15 23. The horological device of claim 22 further comprising:  
a programming unit for programming the charge storage element by operating the charge injector.

20 24. The horological device of claim 23 further comprising:  
a request processing unit for processing requests to program the charge storage element.

25 25. The horological device of claim 23 further comprising:  
a status generating unit for generating status from programming the charge storage element.

26. The horological device of claim 18 wherein the charge storage element is a floating gate in a floating gate field effect transistor.

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27. A method for using an horological device, the method comprising:

programming a charge storage element in the horological device by storing an electrostatic charge within the charge storage element, wherein the charge storage element  
5 comprises an internal medium for storing an electrostatic charge and an insulating medium for insulating the internal medium,

wherein the insulating medium substantially  
10 surrounds the internal medium;

wherein the insulating medium has physical properties that allow a charging process for charging the internal medium with an electrostatic charge through the insulating  
15 medium;

wherein the insulating medium has physical properties that allow a discharge process for discharging a stored electrostatic charge from the internal medium through the  
20 insulating medium;

wherein the insulating medium has one or more physical properties that affect a rate of discharge in the discharge process; and

wherein at least one physical property of the  
25 insulating medium has been selected so that the discharge process discharges a stored electrostatic charge at a predetermined rate;

and

discharging the stored electrostatic charge from the  
30 charge storage element.



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first channel region and a second portion of the floating gate is between the second control gate and the second channel region; and

an insulating region comprising insulating material substantially surrounding the floating gate, wherein the insulating region comprises a tunneling region for discharging an electrostatic charge stored in the floating gate through a discharge process, wherein the tunneling region has one or more physical properties that affect a rate of discharge in the discharge process, and wherein at least one physical property of the tunneling region has been selected so that the discharge process discharges a stored electrostatic charge at a predetermined rate.

33. The horological device of claim 32 wherein the tunneling region is between the floating gate and the second channel region.

34. The horological device of claim 32 wherein a selected physical property of the tunneling region comprises a selected thickness of the insulating material.

35. The horological device of claim 34 wherein the selected thickness of the tunneling region is less than 7 nanometers.

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a second floating gate field effect transistor comprising the floating gate, wherein a portion of the floating gate is common to the first floating gate field effect transistor and the second floating gate field effect transistor; and

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37. The horological device of claim 36 wherein a length of the predetermined time period varies with an initial threshold voltage of the floating gate field effect transistor after programming the floating gate.

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38. A method for using an horological device, the method comprising:

programming a first floating gate field effect transistor, wherein the first floating gate field effect transistor comprises a floating gate and an insulating region of insulating material adjacent to the floating gate;  
discharging the floating gate through a second floating gate field effect transistor, wherein a portion of the floating gate is common to the first floating gate field effect transistor and the second floating gate field effect transistor, wherein a discharge rate of a discharge process that discharges an electrostatic charge stored within the programmed floating gate is inversely related to a thickness of the insulating region, and wherein the thickness of the insulating region is selected such that a threshold voltage of the second floating gate field effect transistor has a predetermined decay rate after programming the floating gate.

39. The method of claim 38 wherein the predetermined decay rate varies with an initial threshold voltage of the second floating gate field effect transistor after programming the floating gate.

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40. A computer program product on a computer readable medium for use in a data processing system for using an horological device, the computer program product comprising:

5 instructions for receiving a programming request to initialize the horological device; and

10 instructions for programming a first floating gate field effect transistor, wherein the first floating gate field effect transistor comprises a floating gate and an insulating region of insulating material adjacent to the floating gate, wherein a stored electrostatic charge discharges through a second floating gate field effect transistor, wherein a portion of the floating gate is common to the first floating gate field effect transistor and the second floating gate field effect transistor, wherein a discharge rate of a discharge process that discharges an electrostatic charge stored within the programmed floating gate is inversely related to a thickness of the insulating region, and wherein the thickness of the insulating region is selected such that a threshold voltage of the second floating gate field effect transistor has a predetermined decay rate after programming the floating gate.

25 *Sub A5* 41. An article of manufacture comprising:  
an analog time cell; and  
circuitry for allowing a state of the analog time cell to be modified or read.

30 42. The article of manufacture of claim 41 wherein the analog time cell transitions from a non-time-measuring state to a time-measuring state upon receiving an electrostatic charge.

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time determining means for determining an elapsed time period since the analog time cell was programmed,